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WATER SUPPLY AND WATER QUALITY CONTROL STUDY WEARS CREEK BASIN MISSOURI. STUDY OF THE NEEDS AND VALUE OF STORAGE FOR MUNICIPAL AND INDUSTRIAL WATER SUPPLY AND WATER QUALITY CONTROL

Public Health Service
Kansas City, Missouri

August 1965

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WATER SUPPLY AND WATER QUALITY CONTROL STUDY WEARS CREEK BASIN MISSOURI

Study of the Needs and Value of Storage for Municipal and Industrial Water Supply and Water Quality Control

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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WATER SUPPLY AND WATER QUALITY CONTROL STUDY

WEARS CREEK BASIN

MISSOURI

ABSTRACT

A Survey of the Wears Creek Basin discloses that there is no future need for storage for municipal and industrial water supply or for streamflow regulation for the purpose of water quality control. These conclusions are based on the results of engineering and demographic studies of the basin.

Prepared for

DEPARTMENT OF THE ARMY

U. S. Army Engineer District

Kansas City, Missouri

August 1965

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I. INTRODUCTION

Request and Authority

In a letter dated September 18, 1964, the Kansas City District of the Corps of Engineers requested that the Public Health Service: "...determine the present and prospective needs for water quality control and for water for municipal and industrial uses in the following basins...Wears Creek, in the vicinity of Jefferson City, Missouri."

This study has been made in accordance with the Memorandum of Agreement dated November 4, 1958, between the Departments of Army and Health, Education, and Welfare, relative to the Water Supply Act, as amended (43 USC 3906) and the Federal Water Pollution Control Act, as amended (33 USC 466 et seq).

Purpose and Scope

The purpose of this study is to determine the need for and value of storage for municipal and industrial water supply and quality control in the Wears Creek Basin, located in central Missouri. The study covers a 50 year period from 1965 to 2015 as requested by the Corps of Engineers.

II. SUMMARY OF FINDINGS AND CONCLUSIONS

Summary of Findings

1. The Corps of Engineers is studying the feasibility of constructing a multipurpose reservoir on Wears Creek.

2. The study area, Wears Creek Basin, with a drainage area of 14.1 square miles, is located in north central Cole County, Missouri, including a portion of Jefferson City.

3. The economic study area is Jefferson City, Missouri, which had a 1960 population of 28,228.

4. No wastes are discharged to Wears Creek.

5. Jefferson City obtains its water from the Missouri River. The average municipal and industrial use is approximately 63 gpcd (gallons per capita per day).

6. Wears Creek has gone dry several times in the last ten years.

Conclusions

1. The economic study area is projected to grow from 33,000 persons in 1965 to a population of 65,000 in 2015.

2. The municipal and industrial water demands for Jefferson City will increase from 2.0 mgd in 1965 to 8.1 mgd in 2015. Existing sources can more than meet this projected demand; therefore, there is no need for storage in the proposed Wears Creek Reservoir for municipal and industrial water supply.

3. There are no present or projected waste loadings on Wears Creek and no extensive pollution from urban runoff is anticipated; therefore, there is no need for storage in the proposed reservoir

to provide streamflow regulation for water quality control.

4. Backwater from the Missouri River may, at times, form stagnant pools in lower Wears Creek. This situation could be alleviated by channel improvement along Wears Creek.

III. PROJECT DESCRIPTION

Wears Creek Basin is contained within Cole County, Missouri. The stream flows through the heart of Jefferson City, the capitol of Missouri. It enters the Missouri River at mile 142.6. The damsite proposed by the Corps of Engineers is on the main stem of Wears Creek approximately 0.2 miles upstream from Jefferson City's city limits. (See map (Figure 1) at end of report.) The proposed reservoir has a drainage area of 4,680 acres or 7.3 square miles and at conservation level a capacity of approximately 5,100 acre-feet, a surface area of approximately 285 acres, and a depth at damsite of approximately 48 feet.

IV. STUDY AREA DESCRIPTION

Geography

Wears Creek is a small tributary of the Missouri River joining the main stem at Jefferson City, Missouri. The basin is about 2.5 miles wide and 5.5 miles long and lies on the south side of the Missouri River completely within Cole County. (See map (Figure 1) at end of report.) The lower part of the basin is occupied by Jefferson City where the stream channel has been modified by bridges and other structures.

Topography

Land elevations in the Wears Creek Basin range from approximately 820 feet in the headwaters to 520 feet at the mouth. The basin is moderately hilly with a well developed dendritic drainage pattern. The principal tributaries are North Branch and East Branch, each draining less than 2,000 acres.

Climate

The average annual precipitation at Jefferson City is 38 inches, with the minimum annual rainfall of record being 22.96 inches in 1901. The mean annual temperature at Jefferson City is 55° F; the highest of record was 114 degrees in 1901, and the lowest was 23 degrees below zero in 1905.

V. WATER RESOURCES OF THE STUDY AREA

There have been no continuous gage height or discharge measurements on Wears Creek. In the last ten years, Wears Creek has gone dry many times and remained completely dry for prolonged periods of time. Moreau River, which at one point flows through extreme southern Jefferson City, has a 14 year average discharge of 327 cfs at a gaging station 5.75 miles downstream from the confluence of North and South Moreau Creeks. There are no published flow data on the Missouri River at Jefferson City. Upstream at the Booneville, Missouri, gaging station the 38 year average flow is 55,870 cfs.

The ground water in this general area at present plays only a small role in the development of water resources.

VI. ECONOMY

To determine the future municipal and industrial, and quality control water requirements in Wears Creek Basin, an appraisal of the area's present and future population and industrial growth potential is necessary.

For purposes of this preliminary report, Jefferson City has been considered as the economic study area. The limited area covered by the river basin (14.1 square miles) prohibits detailed economic studies; therefore, only population was projected.

Past and Present

The population in Jefferson City (the State Capitol of Missouri) has increased gradually from 11,850 in 1910 to 28,228 in 1960. Table VI-1 depicts historical population data for Jefferson City.

Table VI-1

Population Data for

Jefferson City, Missouri

1910 - 1960

	Population	Percent Increase over Preceding Census
1910	11,850	
1920	14,490	22.3
1930	21,596	49.0
1940	24,268	12.4
1950	25,099	3.4
1960	28,228	12.5

Future

The population of Jefferson City is expected to continue to increase and reach approximately 65,000 by 2015.

VII. WATER REQUIREMENT - MUNICIPAL AND INDUSTRIAL

The municipality of Jefferson City presently serves approximately 31,500 persons with an average of 2.0 mgd (million gallons per day). This constitutes an average per capita per day use of 63 gallons. The Missouri River serves as the source of this water supply.

The increase in municipal and industrial water requirements during the study period is based on population growth, commercialization, and development of new water-using devices for the home. Jefferson City is expected to have a steady light industrial and commercial growth. Based on this, the municipal water use is expected to increase from 63 gpcd (gallons per capita per day) in 1965 to 125 gpcd in 2015. This includes light water-using industries and commercial establishments. This will mean an increase from 2.0 mgd in 1965 to 8.1 mgd in 2015.

The expansion of the present water supply facility on the Missouri River will satisfy the estimated municipal and industrial water demands at Jefferson City. Additional flexibility in the water supply system could be obtained by developing storage and water supply facilities on Moreau River, just south of Jefferson City.

With these two sources of supply, there will be no need for an additional source for municipal and industrial water supply in the proposed Corps of Engineers reservoir on Wears Creek.

VIII. WATER QUALITY CONTROL

At present, there are no municipal or industrial waste loadings discharged to Wears Creek. Jefferson City discharges its waste to the Missouri River. It is not anticipated that there will be any future waste loadings on Wears Creek below the proposed reservoir. Agricultural pollution is of such small proportions and is projected to continue as such that it is considered insignificant.

At times during high water on the Missouri River, there is a considerable amount of backwater in Wears Creek. After the high water recedes, there may be stagnant pools formed in lower Wears Creek, which could be eliminated by channel improvements. On this basis, it is not felt that releases from the proposed Corps of Engineers' reservoir would be required to maintain water quality in Wears Creek Basin.

IX. BENEFITS

Water Supply - Municipal and Industrial

There is no need for storage in the proposed Corps of Engineers' reservoir on Wears Creek for municipal and industrial water supply.

Water Quality Control

There is no need for storage in the proposed Wears Creek Reservoir for releases for water quality control. If a small amount of storage were included in the proposed reservoir to sustain a minimum flow in the stream, the benefits resulting from it would not be considered assignable to water quality control.

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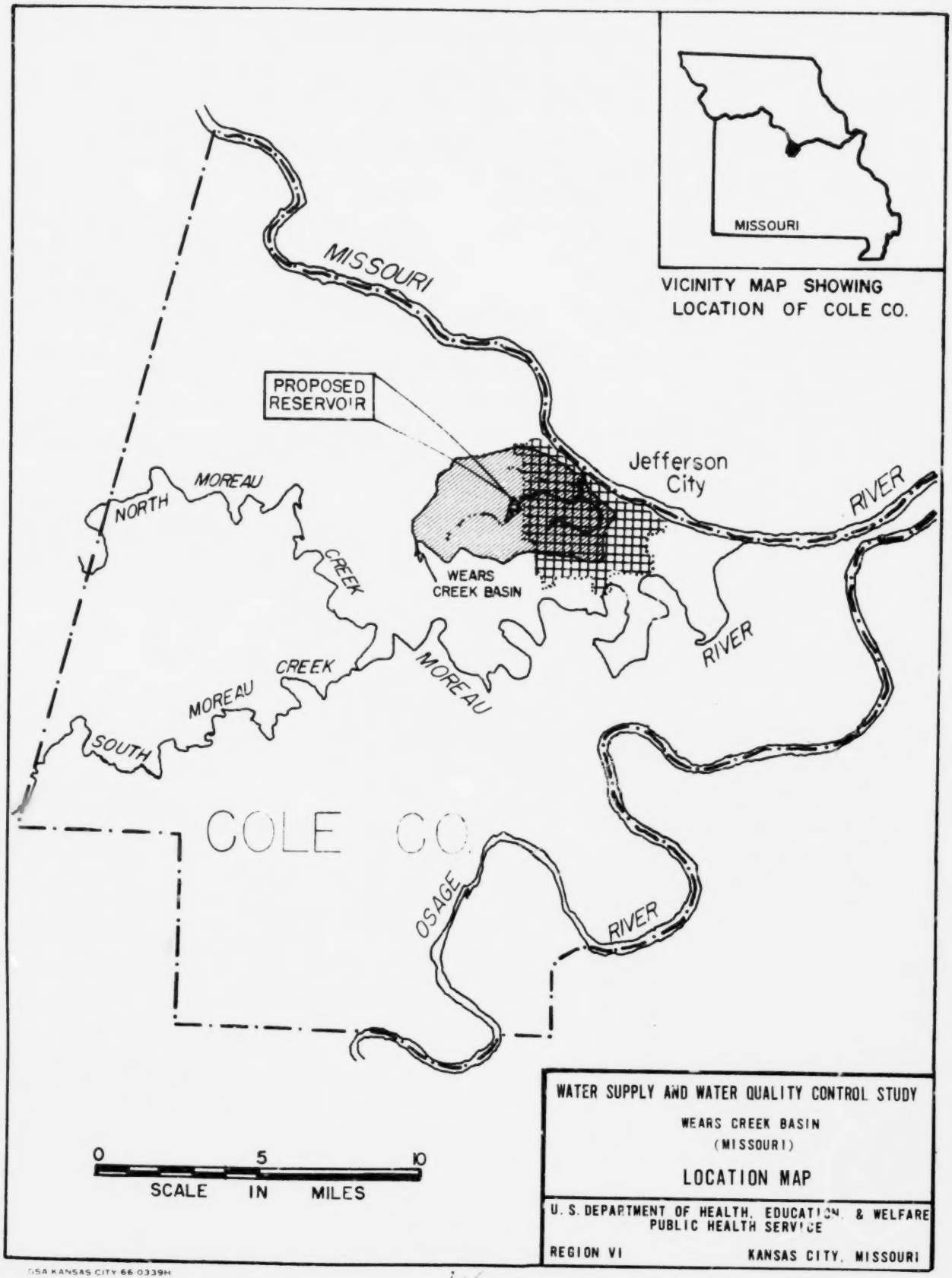

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Figure 1